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Report on the United Nations/Malaysia Workshop on Bridging the Digital Divide: Space Technology Solutions

(Kuala Lumpur, 20-24 November 2000)*

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* The Workshop ended on 24 November 2000 and some information required for writing the report on the Workshop was submitted to the Office of Outer Space Affairs in early December 2000. Therefore, it was not possible to submit the entire report for processing before 4 January 2001.

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I. Introduction

A. Background and objectives

1. The Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) and the Vienna Declaration on Space and Human Development recommended that activities of the United Nations Programme on Space Applications should promote collaborative participation among Member States at both the regional and international levels, emphasizing the development of knowledge and skills in developing countries.

2. At its forty-second session, in 1999, the Committee on the Peaceful Uses of Outer Space endorsed the programme of workshops, training courses, symposia and conferences planned for 2000. Subsequently, the General Assembly, in its resolution 54/67 of 6 December 1999, endorsed the United Nations Programme on Space Applications for 2000. The workshop was co-sponsored by the United Nations and the Government of Malaysia, for the benefit of developing countries of the region of Asia and the Pacific, and was hosted by the Ministry of Science, Technology and the Environment of Malaysia.

3. The main objective of the workshop was to review the status and projected directions of Internet delivery via satellite with special emphasis on (a) current and future development of the Internet-via-satellite market in Asia and the Pacific; (b) backbone Internet satellite trafficking; (c) local user access; (d) remote and rural Internet services; (e) geosynchronous, medium- and low-Earth orbit (GEO, MEO and LEO) broadband satellite systems; (f) high-altitude long-endurance stratospheric platforms; (g) content delivery issues; (h) applications such as telemedicine and electronic (e-) learning; and (i) development of regional and international cooperation.

B. Programme

4. Representatives of various governmental institutions and private industry from developed and developing countries were briefed on the latest developments in satellite solutions for delivery of Internet services during the five-day workshop. The aim was to familiarize participants from the region of Asia and the Pacific with both practical and cost-effective space-based solutions that were currently available for areas with underdeveloped telecommunications infrastructures.

5. The workshop was the first on this subject organized within the framework of the United Nations Space Applications Programme and is part of an ongoing effort by the United Nations to promote wider use of space technology and greater cooperation in the efforts of the United Nations to bridge the digital divide between developed and developing countries and within developing countries.

C. Attendance

6. The workshop was attended by 80 participants from 27 Members States and organizations. Participants and speakers at the workshop came from the following countries: Azerbaidjan, Bangladesh, Cambodia, China, France, India, Indonesia, Kazakhstan, Japan, Malaysia, Maldives, Mongolia, Myanmar, Pakistan, Republic of Korea, Russian Federation, United States of America and Viet Nam. The following entities of the United Nations system were represented: the Office for Outer Space Affairs of the Secretariat, the Centre for Space Science and Technology Education in Asia and the Pacific, affiliated to the United Nations, the Economic and Social Commission for Asia and the Pacific (ESCAP), and the International Telecommunication Union. The Asia-Pacific Broadcasting Union, the Asia-Pacific Satellite Communications Council, the European Space Agency, the International Telecommunications Satellite Organization (INTELSAT) and the International Organization of Space Communications (INTERSPUTNIK) were also represented.

7. Funds allocated by the United Nations were used to defray the costs of air travel and daily subsistence allowance of 14 participants from 12 countries. The Government of Malaysia, through its Space Science Studies Division, Ministry of Science, Technology and the Environment, provided board for all participants. The programme for the workshop was developed by the Office for Outer Space Affairs.

II. Observations and recommendations

A. Observations

1. The digital divide

8. The workshop agreed that:

(a) The term "digital divide" dealt not only with lack of information but also with lack of literacy and basic skills, local content and community participation;

(b) Development of human resources was one of the prerequisites to reduce the digital divide. Issues such as equitable access, equitable distribution of wealth, government participation and monitoring of development should therefore be given high priority.

9. The workshop recognized:

(a) That the gap in information technology between the haves and the haves-not was widening, especially between Europe and North America on the one side and Asia and the Pacific on the other;

(b) The challenges posed by the digital divide, which included marginalization of the population and uneven telephony services.

2. Access to information and communications technology

10. The workshop took note that:

(a) Affordable access to information and communications technology (ICT) played a critical role in reducing the digital divide. Issues such as interconnectivity, bandwidth limitation, the next generation network, the economy of interconnectivity and improvement in utilization played an important role in that context;

(b) There was a lack of national and regional initiatives to establish the necessary institutional and infrastructure framework to facilitate efficient routing of national inter- and intra-regional traffic;

(c) Wireless access technology was needed for remote parts of some countries of the region;

(d) Use of the International Mobile Telecommunications-2000 (IMT-2000) standard was one way to bridge the digital divide. The implementation of the satellite-based IMT-2000 would have the following advantages: (i) low initial investment compared with terrestrial systems; (ii) upgradable capacity; and (iii) integrated service;

(e) While much attention was being given to the development of infrastructure to address the digital divide, some countries were experiencing extreme weather conditions, such as heavy rain and floods, that greatly affected the security and sustainability of existing terrestrial telecommunication facilities.

3. Internet

11. The workshop was informed that:

(a) The Internet was driving demand for more bandwidth for the following applications: (i) global growth in the consumer base; (ii) multimedia; (iii) e-commerce; and (iv) Intranet/Extranet networks;

(b) Recent statistics had shown that the region was overtaking the developed countries in Internet use and content development;

(c) While it appeared that Internet broadcasting was experiencing a boom, it had its limitations and constraints. The Internet was not fully meeting the requirements of the broadcasting network, as could be seen in its need for bigger files and for a "point-to-multipoint" distribution protocol rather than the "point-to-point" service offered by the Internet. As such, the Internet was not considered the best medium for that purpose and new technologies should be looked into with a view to distributing the vast amounts of information of broadcasting content, such as the Extranet, broadband network and simultaneous usage of the Internet, broadband and satellite technology.

4. Satellite technology

12. The workshop took note:

(a) Of the need for an affordable space-based ICT system to address the digital divide in the region;

(b) Of the requirements for an ICT system that allowed for (i) rapid and easy implementation; (ii) bypassing network congestion; and (iii) high-quality and cost-effective Internet delivery via satellite;

(c) Of the use of hybrid broadband techniques consisting of a fibre and a satellite, which provided solutions in bridging the digital divide as well as high

security and quality of service (low bit error rate). Digital video broadcasting (DVB) was such a system, providing secure transmissions and a high-speed data rate with easy implementation and upgrading.

13. The workshop was informed that:

(a) Satellite-based telephony service providers were experiencing tough competition from terrestrial operators providing cheaper services;

(b) The three main obstacles to implementation of satellite-based Internet access were (i) higher communications costs than other media; (ii) smaller communications capacity (limited channels); and (iii) time delay as compared with terrestrial technologies;

(c) A space-based communications system was preferred by most countries of the region because of its ability to cover a wide area thereby alleviating problems of reaching sparsely distributed populations and areas with rugged topography that required high investments for ICT infrastructure;

(d) Low-Earth orbit constellations had some advantages, such as (i) global coverage; (ii) low latency; (iii) competitive cost per user; (iv) flexible allocation of capacity; and (v) complementarity to terrestrial infrastructure.

14. The workshop was informed on:

(a) High-altitude platform (HAP) technology, which was currently in the research and development phase and was expected to be deployed after the year 2000. HAP provided an excellent means of delivering broadband communications, at higher frequencies and data rates and with much flexibility as regards airship repositioning and deployment;

(b) A proposed ICT pilot project on a small island in Bangladesh, which would provide Internet connection in a school through the very small aperture terminal (VSAT) link. Through the project the village community would be made aware of distance education, telemedicine and so on. Outside financial assistance was required for implementation of the project.

B. Recommendations

15. The workshop recommended that:

(a) *Digital divide*. Relevant national and international bodies conduct studies on the possible effects of the widening of the digital divide on the economic, social and cultural sectors of society;

(b) *Role of the United Nations*. The Office for Outer Space Affairs look into overall needs as regards space technology, taking into consideration the highly diverse capabilities of countries in the region, because the majority of planned future satellite programmes could not be implemented because of various constraints. Countries of Asia and the Pacific should increase their participation in various activities of the ESCAP Regional Space Applications Programme for Sustainable Development (RESAP) and education and training programmes of the Centre for Space Science and Technology Education in Asia and the Pacific to receive maximum benefits in addressing the digital divide issue in the region. The United Nations and its regional bodies should organize workshops (for example, through RESAP) for decision and policy makers at both the governmental and non-governmental levels and for the private sector to expose them to the potential benefits of ICT for sustainable development. An Asia-Pacific consortium should be established within the framework of the United Nations Information Technology Service (UNITeS) initiative. Regional United Nations bodies and Member States in the region should submit proposals on ICT projects for possible funding in view of the commitment of the Government of Japan to allocate $15 billion over a period of five years for the development of ICT in the region made at the meeting of the group of eight major industrialized countries held in Okinawa in July 2000;

(c) *Information and communications technology*. The region of Asia and the Pacific also be involved in the development of ICT and space-related technologies in the future. There was a need to focus on the bandwidth blockage issue and to examine solutions such as bandwidth-on-demand and bandwidth-on-location. Internet service providers should adopt an interconnection policy to reduce the cost of interconnectivity. Diurnal utilization of network capacity should be improved to enhance affordability of ICT. This might be done by adaptive packaging and pricing of products in order to harmonize consumer expectations with those of the revenue generation. In particular, deploying hybrid applications of the Internet and public switched telephone network technology

might have the desired effect. Developers of commercial technology for rural areas should strive to develop systems that ensured that the annual costs of investment and operation of ICT did not exceed $100 per annum. The figure was based on the current level of network utilization and the income level of the population;

(d) *Satellite technology*. Countries of Asia and the Pacific work together to bridge the digital divide by (i) establishing a regional workforce team; (ii) deployment of third-generation mobile communi-cations technology; and (iii) developing a regional IMT-2000 standard for mobile-satellite services. A proposal for cooperation to develop a low-cost system for high-speed Internet access using LEO satellites should be taken into consideration by the States of the region, given the paramount importance of rural connectivity in the region. An action should be taken to provide high-speed Internet access for small island nations such as the Maldives, which were particularly well suited for satellite communications technology but were not located in the footprint of satellite services currently available. Cambodia, Indonesia and Malaysia should combine their existing solutions for bridging the digital divide (such as mobile Internet units, public Internet kiosks and satellite links) to be tested in their countries and replicated elsewhere if found to be successful. This could take the form of a two-year pilot project funded and endorsed by the United Nations. A web page containing e-versions of the workshop presentations should be established at the web site of the Space Science Studies Division of the Ministry of Science, Technology and Environment of Malaysia.

III. Summary of presentations

A. Global and regional operators

16. It was reported that international systems available in the region, such as INTELSAT, New Skies Satellites, Inmarsat, INTERSPUTNIK, and PanAmSat, now numbered about 20. About 50 domestic or regional satellite systems were operated by approxi-ately 30 enterprises from Australia, China, India, Indonesia, Japan, Korea, Malaysia, the Philippines and Thailand. Almost all these satellite systems were used for video-distribution services, broadcasting services, Internet services and so on through fixed communications satellites. In particular, a multi-channel digital direct-to-home service provided by the new high-powered communications satellites had increased in popularity and high demand was expected from a very large number of potential subscribers.

17. The region was to witness the implementation of a host of new satellite systems, especially systems using Internet protocol technology, but also broadband Internet and the digital broadcasting satellite systems.

18. Deregulation of the telecommunications sector in the region during the 1990s had led satellite operators to offer not only domestic but also regional services. It was desirable for international and regional satellite systems to compete with one another and to make efforts to offer better service at lower prices to countries that did not have their own satellites. In that connection, the role of the Asia-Pacific Satellite Communications Council as a promoter of communi-cations and broadcasting via satellite in the region among member countries and organizations should be mentioned.

19. In 2001, the market leader in backbone IP traffic, INTELSAT, had $90 million in IP-related revenues and managed more than 3.4 gigabits per second (Gbps) in IP traffic, including 800 megabits per second (Mbps) in the region of Asia and the Pacific, indicating that Internet traffic from INTELSAT satellites alone had quadrupled since 1998.

20. Formed through the partial privatization of INTELSAT, New Skies Satellites N.V. (New Skies) was a wholly independent satellite operator with five satellites in orbit transferred from the INTELSAT fleet. New Skies was a global company, offering a wide range of geographical, technical and commercial knowledge. It operated satellites that provided com-plete global coverage in C-band and high-powered Ku-band spot beams over most of the world's principal population centres.

21. A new project entitled INTERSPUTNIK-100M was reported to be offering possibilities for private investors with limited funds and for countries with an average demand for telecommunications traffic that were willing to establish communications networks using their own geostationary communications satellites. Current use of modern large geostationary communications satellites with many transponders was not always economically viable or efficient for regional

and domestic communications networks with medium and small capacities. In such cases, a network of smaller-capacity, lighter geostationary communications satellites would be very efficient.

22. The investment required to manufacture and launch such a satellite was equal to approximately $35-40 million, several times less than the production and launch of a heavy satellite. A Proton-class rocket could launch three such satellites simultaneously into geostationary orbit, while smaller launch vehicles (for example, military missiles converted into inexpensive commercial launch vehicles) would be able to carry one such satellite.

23. The SkyBridge system was designed primarily to address the broadband local access market. However, access to those networks created a real bottleneck in local loop. Addressing the issue was the focus of SkyBridge. As a satellite-based system, SkyBridge provided existing terrestrial networks the "last mile" connectivity that ubiquitous delivery of new broadband services required. SkyBridge could also serve as an autonomous local network connecting subscribers to each other and could offer local area network services in areas with poor terrestrial-based network coverage. Narrowband (voice and facsimile) services would also be possible over the SkyBridge network, should the local operator choose to offer them. In addition to delivering voice services to rural areas, this would allow operators anywhere to bundle complete solutions covering both narrowband and broadband services, wherever market demand justified it.

24. The National Space Development Agency of Japan proposed to implement its I-space programme not only for Japan but also for the whole region of Asia and the Pacific. One important objective of the programme was to make effective use of newly developing satellite communications technologies. The programme was composed of pilot projects and two satellite projects, the mobile communications satellite ETS-VIII and the ultra-high data rate Internet satellite. ETS-VIII could provide for high-quality mobile communications using S-band frequency. The ultra-high data rate Internet satellite could provide the region with 155 Mbps downlink capacity using Ka-band frequency. By demonstrating the usefulness of such new capabilities and their advantages over terrestrial communications, the I-space programme would serve as a bridge to the future operational use of space communications in many fields of application, such as tele-learning, telemedicine and disaster management.

B. Stratospheric technology

25. The workshop was informed that for future multimedia applications in telecommunications and broadcasting systems, novel wireless access systems of high transmission capacity comparable with optical fibre systems would be necessary. On the other hand, Earth observation and disaster monitoring issues had become urgent matters. In order to deploy both communications and Earth observation payloads on the same platform, a programme of research and development of a stratospheric platform, to be stationed above a fixed area at an altitude of about 20 kilometres in the stratosphere had been proposed. Work had started in 1998 to develop airships carrying communications and broadcasting payloads and Earth observation payloads. The Telecommunication Advancement Organization of Japan was participating in the project by developing airship tracking and control subsystems and communications and broadcasting payloads.

C. National experience

26. It was reported that Bangladesh was prone to floods and cyclones. During such natural disasters, the performance of conventional terrestrial telecommunications services deteriorated when most needed by users. Entire telecommunications infrastructures were put out of service and required special maintenance to restore operations once the flood or cyclone was over. Optical fibre and microwave systems had provided Bangladesh with high capacity but the core problem of disaster-resistant telecommunications still remained. This meant that when selecting telecommunications systems in Bangladesh security against natural disasters became a critical issue. Telephone penetration in Bangladesh was still less than 0.5 per cent. If the present rate of investment in telecommunications infrastructure continued, it would take more than 50 years to provide one telephone to every family. Only space technology could provide full coverage immediately all over the country and in a cost-effective manner. Four existing satellite Earth stations would enhance the infrastructure. The country could alleviate its recurrent

flood problem and build up an effective telecommunications infrastructure by the use of wireless or satellite systems with access to both domestic and international networks.

27. CamNet was a cooperative venture between the Ministry of Posts and Telecommunications of Cambodia and the International Development Research Centre of Canada through its Pan Asia Networking programme. Pan Asia was intended to promote the development of communications infrastructure in least developed countries of Asia by seed-funding existing organizations involved in networking. CamNet also provided Internet access to a growing number of other organizations. Its main users were in government departments, educational institutions, business and non-governmental organizations.

28. BigPond was a joint venture between the Ministry of Posts and Telecommunications and Telstra and was currently being upgraded to 1 Mbps. Bigpond served only the commercial sector and had 1,800 registered Internet users. Both CamNet and BigPond were connected to the Internet backbone via satellite.

29. In China the Internet was developing so fast that usage doubled every six months. Because of the development of the terrestrial network infrastructure, satellite communications were no longer the mainstay. Given their unique characteristics, satellite communications would probably serve a niche market such as Internet backbone international connections, small-scale corporate networks and data-broadcasting IP services. In the context of the Chinese communications market, the disadvantages of satellite communications as compared with terrestrial network communications were the high cost of communications, the limited channel capacity and the unavoidable time delays.

30. India was much involved in space technology in the region of Asia and the Pacific. It had its own constellations of communications and remote sensing satellites. At present the Indian National Satellite System (INSAT) had about 80 transponders operating in the C and Ku bands, of which 30 were operating in broadcast mode for distribution either by very high frequency (VHF) or through cable. The national broadcaster Doordarshan covered about 85 per cent of the Indian population with INSAT satellites. There were many other satellite systems covering the Indian region, mostly for broadcasting to cable feeds, including Asiasat, Thaicom, Malaysia East Asia Satellite (Measat), INTELSAT and Asiastar. The first large-scale television broadcast in India was for the rural population and was carried out using satellite technology in the 1970s. It was reported that more than 70 per cent of the population of India lived in rural areas. Availability of telephones and of computers and computer literacy were very low in those areas. The Indian Space Research Organization and some other agencies in India were using a combination of satellite broadcast and information technology for rural development. Three applications projects, for village information services, distance education and a cyclone warning dissemination system, demonstrated that satellite broadcasting in conjunction with information technology could be a possible means of improving the quality of life in rural India.

31. In Indonesia there were more than 6 million telephone lines, a teledensity of 2.9 per cent. The number of Internet subscribers was about 600,000, with 66 Internet providers. There were several Internet service providers using satellite technology, such as Telekomnet Turbo and Palapa Net. Future services were planned through the m^{2}a satellite-based network with coverage of the whole region. Optimized solutions for satellite-based Internet services in rural areas of the country would be public Internet kiosks and the multi-purpose community telecentres.

32. It was reported that telecommunications in general as well as satellite-based communications services were being introduced intensively in Kazakhstan, in particular for public networks. Commercial and state-owned VSAT-based networks used capacity on the following satellite operators: INTELSAT, INTERSPUTNIK, Eutelsat and Inmarsat. Major companies providing fixed services, data communications and Internet services were Kazakhtelecom, Nursat, Astel, TNS-Plus and Katelco. However, only a system using national geostationary satellites would be a cost-effective solution with coverage of the entire country for both broadcasting and communications. Studies were being conducted with the Russian Federation in that regard.

33. Measat Broadcast was reported to be an integrated electronic media enterprise offering wide-ranging multimedia broadcasting services to Malaysia and the region. Equipped with the latest in digital broadcasting technology and positioned strategically within the Multimedia Super Corridor, Measat

Broadcast set the stage for Malaysia's advent into the twenty-first century broadcasting, information and interactive technologies. The ASTRO direct-to-user service was subscription-based and offered 24 television and 8 radio services in digital format. The direct-to-user service would be expanded to include a range of interactive applications, such as distance learning, home shopping, home banking and software download capabilities. Employing the high-powered Ku-band payload of Measat, ASTRO was pioneering direct-to-user digital satellite broadcasting services in Malaysia and the south and east Asian region, a service once considered impractical in areas with heavy rainfall. Until the advent of the Measat system, the introduction of direct-to-user services had been hampered by signal attenuation due to heavy rainfall.

34. Telephone services were available in all the inhabited islands of the 20 atolls of Maldives. Comprehensive telecommunications services were also available to the people living in the capital, Malé, and a few other islands. Because of the geography of Maldives, radio had been the most economical solution for providing trunk lines between islands. A satellite link was used to provide domestic communications services to the four atolls in the far south. Links to other islands, including some tourist resort islands, were maintained through VHF/UHF multi-channel radio systems. Maldives was yet to benefit from the use of satellite technology; one reason for the delay in gaining access to such technology was the size of the country and its population.

35. Aiming to widen its services, the Mongolian Telecommunications Company had reportedly decided to implement and finance the Internet. In August 1997 it had signed a contract for the purchase and installation of equipment and employee training with a United States company, GlobalOne. The Internet network was equipped with the newest equipment of United States companies such as Cisco, Ascend, 3Com and Sun. Owned completely by the Mongolian Telecommunications Company, the MICOM company provided all Internet-related services.

36. Myanmar Posts and Telecommunications was the sole provider of postal and telecommunications services in Myanmar and was making continuous efforts to develop telecommunications infrastructure in the country. The country had a population of over 50 million people, of whom 60 per cent, or over 29 million people, were between the ages of 15 and 64, making them potential users of telecommunications. International direct dialing service became available with the establishment, in 1994, of a Standard A Earth station and a new international gateway/transit combined exchange. Myanmar currently had 1,024 channels direct to 15 overseas destinations. Domestic satellite communications systems were being deployed to ease the access problem, especially in rural and border areas. There were currently 16 domestic satellite Earth stations.

37. It was reported that there was only one Internet access provider responsible for both building the Internet backbone network in Viet Nam and connecting to the international Internet backbone networks. Five Internet service providers were competing to provide Internet services to the public and to 20 private networks offering Internet access to their staff. The number of registered Internet subscribers was still very modest (about 100,000) and the estimated number of users was around 500,000. The Vietnamese authorities were taking the necessary action to make the Internet a driving force behind social development. In domestic projects, satellite communications had often been selected as the main means of transmission in order to widen Internet coverage. Additionally, Viet Nam was developing a national communications satellite, VINASAT. The project would be launched by 2002 and would contribute to the development of national information infrastructure in general and of the Internet in particular.

D. Distance education

38. The main telecommunications initiative of ESA was reported to be the advanced research in telecommunications systems (ARTES) programme. ARTES consisted of five elements, among them ARTES 3 for multimedia technology. The Espresso for Schools pilot project, which was part of the ARTES 3 programme, had been successfully concluded at the end of December 1999. Its objectives had been to demonstrate that satellite delivery was a viable and preferable delivery system for high bandwidth applications that enhanced curriculum delivery in the classroom. During the pilot operation, a complete end-to-end solution was set up and run, with the active participation of some 200 schools in the United Kingdom of Great Britain

and Northern Ireland. The goal was to develop wide-spread commercial deployment to several thousand schools in the commercial development phases that would follow successful pilot operations.

39. The Trapeze project was a satellite-based teaching scheme currently undergoing trials with travelling children in fairgrounds, circuses and other travelling communities that could have far-reaching implications for the future of teaching in remote locations. It was initiated in November 1999 and used satellite technology to link children with teachers in a virtual learning environment by means of a simple portable receiver dish and a computer. A five-week trial linking pupils and teachers in the Netherlands and the United Kingdom using a unique broadband satellite-supported network proved such a success that government departments and education authorities throughout Europe were examining the feasibility of the scheme in other environments. Areas of particular interest included remote locations where traditional Internet connectivity was difficult or where teachers were involved in expensive and time-consuming travel between pupils' homes.

40. It was reported that MahirNet was a joint venture between Telekom Malaysia, the national network provider for telecommunications, and Melewar Academia Holdings. Telekom Malaysia, through its subsidiary TMNet, was also the largest Internet service provider in Malaysia. Currently there were only two such providers in Malaysia and TMNet aimed to have a million subscribers by the end of 2000. Melewar Academia Holdings, through its sister institutions in the Melewar group of companies, was a strong provider of education, including distance education, and ran schools and colleges in several south-east Asian countries. MahirNet was a technology-based company working to synergize the extensive telecommunications infrastructure and technology of its parent companies within the country and to provide access to large telecommunications backbone networks in countries of Asia and the Pacific.

41. The objectives of Planwel University (Pakistan) were to promote education and research in the region in such a way that quality education could reach underprivileged masses globally. Distance education through the use of the Internet offered an opportunity for less developed countries to prepare themselves for the technology-based communities of the new millennium. That had now become possible through the concept of the virtual university. Planwel University believed that in order to make the virtual university a reality for the globalization of education, it was essential (with the help of the local private sector) to expand delivery "points of presence" for these virtual universities in each and every community in less developed nations. Such focal points would act as a catalyst for development and in eliminating disparity. While in effect the virtual universities would host researchers and professors from around the world, the points of presence would be their classrooms in underprivileged communities all over the world. Those researchers and professors would be on the panel of the global mega university system leading to a true virtual forum, disseminating their knowledge through points of presence around the Globe.